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(54) IMPROVEMENTS IN OR RELATING TO THE SHARPENING OF BLADES

(71) I, WILLIAM GEOFFREY PARR of 20 Knoll Road, Abergavenny, Monmouthshire, of British nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to the sharpening of blades, for example the blades of certain woodworking hand tools said blades having a cutting edge defined by the intersection of two ground surfaces.

It is an object of the present invention to provide inexpensive compact blade sharpening machines whereby persons unskilled in the use of an oilstone can produce a good cutting edge quickly and without the need for much skill.

According to one aspect of the present invention there is provided a blade sharpening device comprising a support against which the blade may be reciprocated in a controlled manner, a sharpening stone with its operative face at an angle to said blade, a frame which is carried by said support and upon which said stone is mounted and means for yieldingly urging said stone into contact with said blade.

According to another aspect of the invention there is provided a blade sharpening device comprising a support having a plurality of at least substantially coplanar surface elements against which the blade may be reciprocated, guide means associated with said surface elements for assisting in preventing the blade from oscillating in the plane defined by said surface elements, a sharpening stone with its substantially flat operative face at an angle to said plane, a frame which is carried by said support and upon which said stone is mounted and means for yieldingly urging said frame to bring said stone towards said plane constructed and arranged to ensure that the operative face of said stone is maintained at least substantially in constant angular relationship with said plane.

In apparatus according to one aspect of the invention, when the blade is advanced so that it touches the stone and is then further advanced, the blade will displace the stone in a controlled manner determined by the yieldable frame and the portion of the blade touching the stone will slide across the abrasive surface of the stone. If the stone is pressed against the blade and if, during the movements of the stone and blade, the stone bears in an appropriate manner against a portion of the surface of the blade adjoining and including the cutting edge, the edge will be sharpened. When the blade is withdrawn, this portion of the blade surface will again slide across the abrasive surface in the reverse direction and the edge will be further sharpened.

In apparatus according to another aspect of the invention, if during the reciprocatory motion of the blade across the abrasive surface of the stone, the stone bears, in an appropriate manner against a portion of blade surface adjoining and including the cutting edge, the edge will be sharpened.

To avoid high local pressure between the stone and the blade in the later stages of sharpening, the surface adioining and including the cutting edge, produced by the abrasion of the stone, should preferably conform to the relatively moving surface of the stone. In a preferred arrangement, this may be achieved by using a stone with a plane abrasive surface and by ensuring that the motions of the blade and of the stone are irratational. The surface produced by abrasion will then be plane. In a further preferred arrangement, said local pressures in the later stages of sharpening may be limited by the use of a sharpening stone

[*Price 25p*]

with a substantially plane surface and by ensuring that the motions of the blade and stone are substantially irrotational.

In a further preferred arrangement, applicable to blades provided with suitable substantially plane surfaces and substantially straight edges, said substantially irrotational motion of the blade may be achieved by moving the blade while holding said plane surfaces and straight edges against appropriate guiding means.

A blade sharpener constructed in accordance with the present invention will now be described with reference to the accompanying drawings by way of example only and is in no way limitative of the invention. This particular embodiment is intended for sharpening wood chisels. It is described as positioned for normal operation but could of course be used in other positions.

In the said drawings,

Figure 1 is a cross-sectional, in side view, of the exemplary blade sharpener;

Figure 2 is a side elevation of that part of said sharpener which comprises a sharpening device; and

Figure 3 is a plane of the said sharpener.

The sharpener comprises a one-piece moulding 1 of a plastics material, roughly rectangular in form and symmetrical about a central, longitudinal vertical plane of symmetry. At the top of the base moulding is a straight shallow longitudinal guide channel 3 which is shorter than the length of the blade of any chisel which is to be sharpened and is slightly wider than the widest blade which is to be sharpened and has substantially parallel vertical sides and a horizontal bottom. At the bottom of the base moulding are laterally outwardly extending flanges 5 provided with screw holes for attachment to a bench or other convenient support. Below the guide channel, the base moulding is hollow with the bottom and one end open. An upper portion of an end wall at the other end of the base moulding is thickened inwards to form an upper spring mounting block 7 having a downward-facing first rectangular face which has its plane and its inner edge perpendicular to said plane of symmetry and which is slightly inclined to the horizontal with the inner edge highest. The upper spring mounting block is provided with two spaced blind holes, perpendicular to said first rectangular face for receiving self-tapping screws 9. A bottom portion of the end wall is thickened outwardly to form a lower spring mounting block 11 having a downward-facing second rectangular face which lies a short distance above the bottom of the base moulding and which has its plane and its inner edge parallel with those of said first rectangular face, which lower spring mounting block 11 has two spaced blind screw holes perpendicular to said second rectangular face. The plane inner face 13 of the end wall which extends from the block 7 to block 11 is substantially perpendicular to both said faces. It will be appreciated that mouldings of this type with the bottom and one end open with stepped spring mounting blocks and with parallel screw holes perpendicular to the faces of these blocks can be produced with a simple mould.

One end of an upper leaf spring 15 is clamped by the screws 9 against said first rectangular face. This upper leaf spring which is made from thin sheet metal, extends symmetrically about said plane of symmetry through the hollow base moulding to beyond its open end where the other end of the spring is clamped by rivets 17 to an upper horizontal flange forming part of a movable carriage 19. A similar lower leaf spring 21 is similarly clamped to the lower spring mounting block 11, extends through the base moulding and is clamped by rivets 23 to a lower horizontal flange of the carriage. When no load is applied to the carriage 19, each surface of each spring is perpendicular to said plane of symmetry but is concave downwards near the end attached to the base moulding and concave upwards near the other end, the curvatures being such that the springs exert a download on the carriage when the carriage is within its working range of movement and such that, when the carriage occupies some position near the middle of said working range, the unclamped portion of each spring follows a gentle curve of roughly constant radius.

The carriage 19 which lies symmetrically about said plane of symmetry is made by folding a single plane sheet metal blank and comprises a vertical rectangular web set perpendicular to said plane of symmetry, two plane parallel vertical flanges 25 projecting from the sides of the web and partly overlapping the base moulding.

The perpendicular distance between said upper and lower horizontal flanges of the carriage 19 is equal to the perpendicular distance between the blocks 7 and 11. Each vertical flange 25 extends upwards beyond the upper face of the base moulding 1 and support a sharpening stone assembly 27.

The assembly 27 pivots on a transverse clamping bolt 29 which passes, in turn, through a hole in one flange extension, through pivot holes in left and right hand stone holders 31 (figure 3) engaging opposite sides of a thin sharpening stone

33, through a hole in the other flange extension and through a tubular spacer beyond which a threaded portion of the bolt engages a wing nut 35. The stone, made from bonded alumina, has square parallel faces and narrow rectangular edges perpendicular to these faces. Each stone holder 33 is made from a plastics material has a plane vertically extending outer face bearing against the inner face of one of the flanges 25.

The stone is located between flanges on the holders 31 which are shallow and narrow to ensure that the exposed portion of the face of the stone extends right across the guide channel in the base moulding. The flanges 25 of the carriage are flexible so that when the wing nut 35 is tightened the carriage, the stone holders and the stone are securely clamped together. The lower face of the clamped stone is then perpendicular to said plane of symmetry and is inclined to the horizontal. This inclination, which determines the sharpening bevel angle of the chisel may be indicated by means of a scale 37 (figure 2) on one of the stone holders and a pointer on the carriage or by a pointer on one of the stone holders and a scale on the carriage.

In the absence of a chisel the spring-loaded carriage 19, presses the stone holders downwards to bear against an upper end portion of the base moulding which portion is shaped so that the lower face of the stone just clears the end of the guide channel at the top of the base moulding. Before using the sharpener, the stone is set to an inclination equal to the desired sharpening bevel angle and clamped to the carriage by means of the wing nut 35. One setting to a particular angle will normally suffice for many sharpenings.

The chisel to be sharpened may be held by the handle with one hand with the blade resting, bevel upwards, in the guide channel. The fingers of the other hand are used to press the blade downwards and sideways so that the flat of the blade adjoining the cutting edge bears against the bottom of the channel while the longitudinal side of the blade bears against one side of the channel (as shown in figure 3). Both hands are used to advance the chisel, until the blade touches the stone and then to move it repeatedly forwards and backwards in contact with the lower face of the stone while keeping the blade against the channel as described above. With a little skill this motion can be achieved single handed. Usually the flat of a chisel blade is substantially plane and the longitudinal edge faces are substantially plane parallel and perpendicular to the flat so that the said motion of the chisel will then be substantially linear and irrotational. If the base moulding is provided with a modified guide channel of which the bottom has horizontal coplanar end portions and a lowered middle portion, it is possible to achieve a controlled substantially irrotational motion with a slightly bent chisel blade which would rock in a flat-bottomed channel.

As the blade moves forwards and backwards in the channel in contact with the stone, the stone and its carriage move up and down. The leaf spring linkage ensures that the motion of the carriage and the attached stone is substantially irrotational. The leaf springs also press the stone against the chisel to abrade it.

The sharpener may be provided with means whereby the carriage can be held raised, with the stone well clear of the base moulding so that the 'wire edge' can be removed by abrading the flat of the chisel against the underside of the stone.

To even out wear on the stone it may occasionally be removed from its holders, turned through 90 and replaced.

If the sharpener described above, the leaf springs serve both to control the motion of the stone relative to the guide channel and to press the stone against the chisel. These ends may be achieved in many other ways, for example by the use of one leaf spring in conjunction with a pivoted arm, by the use of a pivoted arm parallelogram linkage with a separate spring, by the use of one long spring-loaded pivoted arm, by the use of a spring loaded carriage which slides along guide members attached to the base member or by the use of other known means of guidance and means for applying pressure.

WHAT I CLAIM IS:

1. A blade sharpening device comprising a support against which the blade may be reciprocate in a controlled manner, a sharpening stone with its operative face at an angle to said blade, a frame which is carried by said support and upon which said stone is mounted and means for yieldingly urging said stone into contact with said blade.

2. A blade sharpening device comprising a support having a plurality of at least substantially coplanar surface elements against which the blade may be reciprocated, guide means associated with said surface elements for assisting in preventing the blade from oscillating in the plane defined by said surface elements, a sharpening stone with its substantially flat operative face at an angle to said plane, a frame which is carried by said support and upon which said stone is mounted and means for yieldingly urging said frame to

bring said stone towards said plane constructed and arranged to ensure that the operative face of said stone is maintained at least substantially in constant angular relationship with said plane.

3. A blade sharpening device according to Claim 2 wherein the position of said stone upon said frame is adjustable so as to vary the angle of the stone relative to said plane surface.

4. A blade sharpening device according to claim 3 provided with means for indicating the angle between said stone and said plane surface.

5. A blade sharpening device according to Claim 2 wherein said frame is mounted on said support by means of two leaf springs.

6. A blade sharpening device according to Claim 2 wherein said stone is flat and square shaped.

7. A blade sharpening device according to Claim 2 wherein said support comprises an inverted U-shaped member with said plurity of substantially coplanar surface elements at the top and flanges at the end portion of each limb whereby said support may be clamped in position.

8. A blade sharpening device according to Claim 5 constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.

W. G. PARR.

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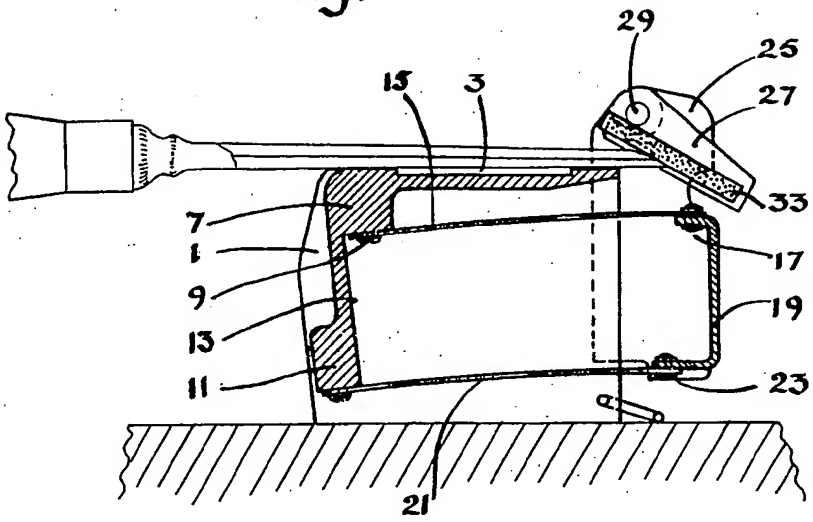
1 SHEET This drawing is a reproduction of the Original on a reduced scale

Fig. 1



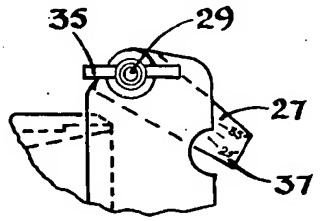


Fig. 2

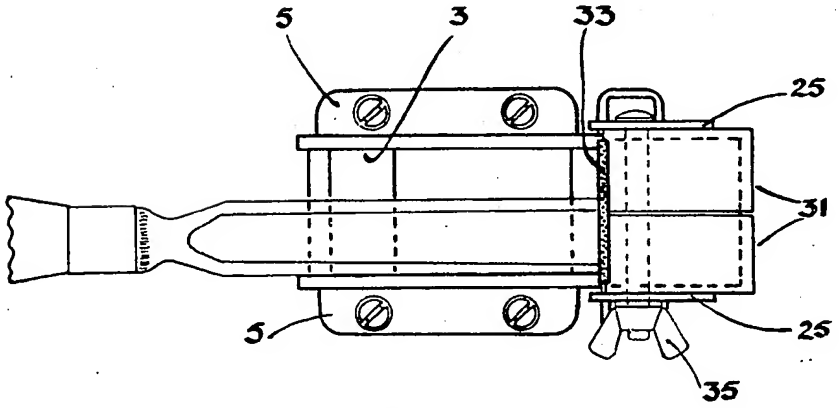


Fig. 3